

THE MINERAL INDUSTRY OF TURKEY

By Philip M. Mobbs

In general, the diverse mineral industry of Turkey, showed higher output levels in 1996 compared with those in 1995. The nation's economic crisis continued owing to a combination of factors, such as public sector debt, rapid devaluation of the Turkish lira, the new Government and associated high levels of political uncertainty, inflation, and unemployment (Bodgener, 1997; Butter, Ash, and Bodgener, 1997). The primary mineral sector's contribution to the economy traditionally has been slightly more than 1% of the gross domestic product (GDP). It was estimated that value-added secondary mineral commodities, including refined petroleum products, steel, cement, glass, and certain inorganic chemicals, accounted for about 70% of the value of the nation's manufacturing output. Total (primary plus secondary) mineral industry revenues were estimated to be about 15% of GDP.

The geology of Turkey is extremely complex and is reflected in the diversity of its mineral deposits. Best known for its industrial minerals, Turkey was a major producer of barite, boron minerals, celestite (strontium), emery, feldspar, limestone, magnesite, marble, perlite, and pumice. The country continued to be a major world producer of refined borates and related chemicals, cement, ceramics, and glass. A wide variety of primary metallic minerals was produced as well, but output generally was not considered large to be by world standards. Chromite was the most significant metallic mineral in this sector. Turkey was a significant producer of ferrochromium and of steel. Capacity expansion projects continued at many secondary mineral production facilities. Most mineral exploration in Turkey by international companies was for gold, copper, and zinc.

Government Policies and Programs

The Turkish economy was burdened by high inflation that had reached 80% on an annual basis by the end of 1995 and continued at the same rate through 1996 (Barham, 1997b). The Government was a major player in most sectors of the Turkish minerals industry through various parastatal (state-owned) industrial corporations, banks, and shareholdings in a number of private companies. The private sector component has grown, especially since the passage of Mining Law No. 3213 in 1985. Hydrocarbon activities were regulated under Law No. 6326 of 1952, Law No. 6556 of 1955, Law No. 6987 of 1957, Law No. 1702 of 1973, and Law No. 2808 of 1983.

Many parastatal corporations have been maintained over the years through high levels of Government borrowing and spending. The Government continued the divestment of its

minerals sector holdings to both domestic and foreign investors. Privatization of the general minerals group, Etibank Genel Müdürlüğü, was proposed. Several local and international companies were reviewing lignite and powerplant operations slated for privatization in 1997. Additionally, the privatization of most of the state's petroleum refineries and its remaining cement plants were under negotiation. General aspects of and some specific sales within the overall privatization program have been delayed and/or thwarted by legal challenges from trade union and political entities; these delays are anticipated to continue.

Environmental Issues

Rapid growth of industry and increasing urbanization of the population have led to increased awareness of and emphasis on environmental issues. A major issue was the use of lignite for domestic heating and for thermal powerplants that provide more than 50% of the country's electricity. For several years, imported natural gas and liquefied natural gas (LNG) has been piped to the Ankara and the İstanbul metropolitan areas where it has replaced lignite for domestic heating, thereby greatly reducing wintertime air pollution. The gas pipeline network was being extended to other cities. Environmental considerations were affecting the Government's plans to address the growing electricity shortages in the country through the construction of new powerplants.

Environmental issues have become a factor in Turkey's foreign relations. Proposed petroleum development in Kazakstan and other landlocked Turkic republics risk oil spills or other shipping hazards if crude petroleum is shipped by supertankers via the Black Sea and the narrow Bosphorus and Dardanelles Straits. As an alternative, Turkey began construction of a 1,625-kilometer (km) pipeline to Yumurtalik on the Mediterranean.

Local opposition to the development of gold mines near the Aegean coast continued. The controversy centered the use of sodium cyanide in heap-leaching extraction methods, and the potential adverse impact on the tourist industry if cyanide were to leak into the streams and aquifers.

Production

As shown in table 1, Turkey produced a wide variety of mineral commodities. For most metallic commodities, output levels in 1996 were about the same or higher than those in 1995. Chromite was a notable exception—production declined owing, in part, to reduced international demand. Etibank

expanded its boron production in 1996, and the country's cement and magnesite output also increased. Few significant production increases in the diverse industrial mineral sector were projected for the year. Data traditionally have been incomplete for many industrial minerals owing to either output being kept proprietary or the minerals being unreported raw materials for reported finished products, such as cement. In the energy mineral sector, hard coal production rebounded, and lignite production again posted an increase.

Trade

Turkey had a well-developed international mineral trade. Turkey was a major exporter of steel and ferrochromium and exported limited quantities of chromite, copper, and zinc ores, and refined metals. In contrast with metallics, Turkey exported a wide variety of industrial minerals and derived chemicals, however, the value of which dropped slightly in 1996 to \$542 million compared with \$563 million in 1995 (Öktem, 1997). The country's boron, cement, glass, and ceramics exports were among the world's highest. Turkey's mineral imports were dominated in value by crude and refined mineral fuels, as well as a variety of metallic ores, steel, and other smelted and refined metals.

In July, the Government signed a free trade agreement with the European Coal and Steel Community. The agreement effectively eliminated 95% of the customs duties on steel products between Turkey and the European Union.

Structure of the Mineral Industry

Traditionally, several sectors of the Turkish minerals industry have been dominated by large parastatals. (See table 2.) The Government continued its major privatization program. Private companies have become the dominant producers of a number of commodities, notably, chromite, several industrial minerals, cement, and steel. The mining sector has been estimated to comprise between 750 and 800 mining "establishments," a term roughly equivalent to "company" or "company division." These owned and/or operated about 3,000 mines. Most of the mines in the public and private sectors were small by world standards.

Among the state-owned minerals corporations, the various subsidiaries of Etibank dominated or produced the country's entire output of aluminum, blister copper, boron minerals and chemicals, ferrochromium, and refined zinc. Etibank remained the largest individual chromite producer in Turkey (about 21% of the total in 1996). Turkish hard coal was mined by Türkiye Taşkömürü Kurumu Genel Müdürlüğü, and almost 90% of Turkey's total lignite output was accounted for by Türkiye Kömür İşletmeleri Kumumu. About 78% of Turkey's total output of crude petroleum and all its natural gas were produced by Türkiye Petrolleri Anonim Ortaklığı (TPAO) and its subsidiaries. The pipeline company, Boru Hatları ile Petrol Taşıma A.Ş. (Botas), a subsidiary of TPAO until 1995, controlled virtually all the pipeline transport of mineral fuels. Türkiye Petrol Rafinerileri A.Ş. was by far the largest oil refiner in the country. Until recently, cement production was dominated

by the parastatal Türkiye Çimento ve Toprak Sanayii T.A.Ş., but privatization has significantly reduced its sectoral share.

Maden Tetkik ve Arama Genel Müdürlüğü (MTA) was the state agency responsible for geologic exploration and research in Turkey.

Commodity Review

Metals

Aluminum.—Plans to expand Etibank's Seydisehir aluminum smelter from 60,000-metric-ton-per-year (t/yr) capacity to 100,000-t/yr capacity were revived in 1996. A prebake anode system was proposed to replace the existing Soderberg anode system.

Copper.—Karadeniz Bakır İşletmeleri A.Ş. (KBİ), a subsidiary of Etibank, remained Turkey's largest producer of copper ore and concentrates and was the only producer of blister copper. Copper concentrate feed for KBİ's Samsun smelter came mainly from the company's mines and concentrators in the Murgul District near Artvin. Pyrite output from the KBİ mines and from those directly operated by Etibank contains up to 0.7% copper. The pyrite was used primarily to produce sulfuric acid for Turkish fertilizer manufacturers.

Inmet Mining Corp. of Canada wrote down as a loss its \$113 million¹ investment in the recently opened Çayeli copper-zinc underground mine as an unrecoverable investment (Mining Journal, 1996). The metallurgical complexity of the ore resulted in lower-than-planned recoveries. Because of the financial difficulties, capital expenditures at the mine were temporarily suspended in October, and ore output was increased. The mine produced separate concentrates of copper and zinc, which were exported.

Gold and Silver.—In recent years, Turkey's precious metals output has been as credits in base-metal (particularly copper) refinery slimes and/or smelted metals exported to Europe plus silver mined at one site. Most Turkish copper ores grade 1 to 2 grams per metric ton of gold along with more-variable silver.

Three gold properties were pending development into mines. All three projects were facing strong, organized, local opposition to the proposed use of sodium cyanide for gold extraction. The Ovacık (Dikili) gold deposit, about 12 km west-southwest of Bergama, was held by Eurogold Madencilik Ticaret ve Ltd. A.Ş., a joint venture of Mine Or SA of France (66.7%) and Inmet (33.3%). Eurogold began construction after receiving final Government approval for the Ovacık Mine in March 1996. The Küçükdere deposit, about 10 km southeast of Edremit, was owned by Tüprağ Metal Madencilik Ticaret ve Ltd. Şti., formerly a subsidiary of Gencor Ltd. of South Africa that was acquired by Eldorado Gold Corp. of Canada. Tüprağ also held the Kaymaz property, about 145 km west-southwest of Ankara.

¹Values have been converted from Canadian dollars to U.S. dollars at the 1996 yearend rate of C\$1.37 = US\$1.00.

Lead and Zinc.—The Government sold Etibank's interest in Cinkur Kurşan Metal Sanyii A.Ş. in June 1996. The Cinkur refinery was acquired by Kayseri Maden Metal ve Ticaret A.Ş., a consortium of Mineral Export Co. of Iran (55%), Isko Ltd. of Canada (10%), Ekin Madencilik of Turkey (5%), S.A. Hassan of Iran (5%), Masoud Shamoradi Co. of Iran (5%), and Saradari Macad Madani Co. of Iran (5%) (Metal Bulletin, 1996; Our Turkish Correspondent, 1996). The new owners reportedly were refurbishing the zinc operation, increased zinc production, and proposed to begin refining lead in 1997 (Metal Bulletin, 1997).

Steel.—Turkish total crude steel production reportedly increased in 1996 to 13.4 million metric tons (Mt) despite declining demand. The Ereğli Demir ve Çelik Fabrikaları T.A.Ş. (Erdemir) was the sole flat products producer. Erdemir increased its production capacity to 3 Mt and initiated a feasibility study concerning an expansion of capacity to 4 Mt per year. In December, the Government's Privatization Administration proposed a partial divestment of the state's interest in Erdemir. Karabük Demir ve Çelik A.S. completed an overhaul of its three blast furnaces during the year.

Turkish scrap buyers were significant importers of Ukrainian scrap metal during 1996, although many private mini-mills had curtailed production operations owing to weak international demand.

Industrial Minerals

Etibank increased run-of-mine boron production to 2.4 Mt in 1996 compared with 1.8 Mt produced in 1995. The company anticipated a similar increase in 1997. Turkey produces almost 50% of the world's boron. A 120,000-t/yr magnesite-washing plant was built near Eskişehir by Comag Continental Madencilik Sanayii Ticaret A.Ş. Persa Perlit Türevleri Sanayi ve Ticaret Ltd. Şti. began perlite mining operations at Biga, near Çanakkale. Silver & Baryte Mining Co. S.A. of Greece acquired 49% of Pabalk Perlite Sanayi A.Ş. FMC Corp. and U.S. Borax of the United States reintroduced a proposal to develop the Beyazarı trona deposit, approximately 100 km northwest of Ankara. MTA had estimated Beyazarı reserves to be 233 Mt (Erseçen, 1989, p. 80).

Cement.—Turkey was one of Europe's leading cement producers with production exceeding 35 Mt in 1996. Akçansa became the country's largest cement company with the merger of Cimenteries CBR S.A.'s Çanakkale Çimento Sanayi A.Ş. and Sabancı Group's Akçimento Ticaret A.Ş. Postprivatization industry consolidation resulted in Cimenteries CBR-Sabancı Holdings Group, Rumeli Çimento Sanayi ve Tic. A.Ş., Oyak, Lafarge Coppée, Set Group Holding, Batı Anadolu Çimento Sanayii, and the Vicat Co. accounting for 75% of the nation's cement production.

Mineral Fuels

The Turkish Government has been promoting the consumption of natural gas as a clean-burning substitute for

lignite. Declining gas production and reserves were inadequate to meet current demand, estimated to be from 6 billion to 8 billion cubic meters per year of natural gas (Middle East Economic Digest, 1995). For several years, Turkey has imported about 6 billion cubic meters per year of natural gas from Russia via a pipeline through Bulgaria and the Ukraine, but the amount of gas supplied by this route was considered to be insufficient to meet long-term demand. Natural gas demand was expected to increase significantly as proposed gas-fired powerplants become operational. A number of new pipeline scenarios were being discussed to bring Russian, Iranian, and Central Eurasian natural gas across the eastern frontier of Turkey. Turkey was importing LNG from Algeria and Australia via the 6-billion-cubic-meter-per-year-capacity LNG storage and regasification plant at Marmaraereğlisi. Botas was contracted to import about 1 billion cubic meters equivalent per year of LNG from Nigeria beginning in 1999. In August 1996, Botas agreed to buy 190 billion cubic meters of natural gas from Iran over a period of 23 years. Delivery of the gas was not expected to begin for several years. In the interim, Botas contracted to acquire 3 billion cubic meters per year of natural gas from Turkmenistan. During November, Botas agreed to import LNG volumes equivalent to 10 billion cubic meters per year of natural gas from Egypt and 1 billion cubic meters per year of natural gas from Qatar beginning in 1998 or 1999. During December 1996, Botas contracted for an additional 1.4 billion cubic meters per year of natural gas from Yemen and was negotiating to increase Russian gas imports.

TPAO accounted for about 78% of domestic production. Despite bringing 18 new fields online during 1996, national crude oil output was estimated to have increased only slightly to about 25 million barrels. At the beginning of the year, Perenco Plc. of the United Kingdom acquired N.V. Turke Shell's operations in the southeast. Civil unrest adversely affected petroleum exploration activity in the southeastern producing region (U.S. Department of State, 1997).

In December, crude oil began to flow through the Iraqi-Turkish pipeline for the first time since United Nations' sanctions were imposed in 1990. Under U.N. Resolution 986, Iraq was allowed to sell crude oil to fund food and drug purchases. Turkey contracted to buy about 75,000 barrels per day of the Iraqi crude oil. In addition to normal imports, an estimated 11 million barrels per year of diesel fuel was reportedly brought across the border from Iraq (Washington Times, 1995; Reuters, 1997).

Reserves

Turkey's mineral inventory is diverse and large, but many of the deposits, especially for metallic minerals, are small by world standards. Resources of metallic commodities minable by large-scale methods are known for bauxite, chromite, copper and copper-zinc, gold, iron, and silver. Turkey is better known for its deposits of industrial minerals, most significant of which are barite, boron, clays, limestone and marble, magnesite, perlite, pumice, strontium, and trona. The country has large lignite reserves. The crude oil reserves are cumulatively significant but

hosted in a large number of small fields. Natural gas reserves are small.

Many of Turkey's mineral deposits remain unevaluated in terms of current economic criteria, including the use of mechanized mining. The most complete official inventory of Turkish mineral resources is a 1989 MTA report (Erseçen, 1989).

Infrastructure

Turkey's extensive road and railroad infrastructure was heavily used for the transport of mineral commodities. Turkey had 2,092 km of crude petroleum and 2,321 km of refined petroleum products pipelines. The longest stretch of pipeline was the 641-km twin line connecting Iraq with the Ceyhan oil-loading facility at Yumurtalık. Ceyhan was also the terminus for a 447-km pipeline to the refinery in Kırıkkale. The oil port at Dörtöyl, 28 km north of İskenderun, was the terminus of a 494-km pipeline from the oil refinery at Batman, with shorter spurs from this line to the oilfields near Batman (Şelmo) and around Adıyaman. Turkey had about 900 km of natural gas pipeline, which was used to import natural gas from Russia.

Turkey had many ports capable of handling mineral-commodity shipments. Major coal-importing ports included İskenderun and Ereğli. Chromite was shipped from various Anatolian ports on the Marmara coast, as well as from Antalya and İskenderun, which handled all Turkey's ferrochrome exports. Steel, steel scrap, and iron ore imports also were handled at many ports, particularly Aliğa, Ereğli, İskenderun, and Mersin and at various sites in the İstanbul-İzmit area. Turkey's boron minerals and chemicals were exported from Bandırma. Copper concentrates, ore, and blister were shipped from Samsun, and copper concentrates, from Hopa near Artvin, facilities at Rize, and İskenderun. Marine terminals at Ambarlı were used to ship cement.

Total electrical generating capacity in 1996 was 21,217 megawatts (MW), up from 20,951 MW capacity in 1995. (Barham, 1997a). Because of electrical power demand growing at an estimated 8% to 10% per year, Turkey was in the process of greatly expanding its electrical generating capacity.

Outlook

The health of Turkey's mineral economy is likely to hinge significantly on the success of the ongoing privatization program. The economy appears unable to support continued high levels of public spending. Turkey's value-added secondary, mineral sector would appear to be more resilient to future world market fluctuations than is the primary mineral sector. Environmental issues are likely to assume an increasing role in Turkey's economic affairs. Lengthy mine-permitting procedures could lessen exploration interest in the country.

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TABLE 1
TURKEY: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity	1992	1993	1994	1995	1996 e/
METALS					
Aluminum:					
Bauxite 2/	419,872	538,439	445,020	232,278	544,513 3/
Alumina:					
Gross weight	156,474	169,195	155,299	171,978	159,298 3/
Al content	81,570	88,195	80,952	91,000 e/	83,000
Metal, smelter	58,550	58,503	59,750	61,514 r/	60,000
Antimony:					
Ore, mine output:					
Gross weight	5,065	2,100	1,415	7,856 r/	8,000
Sb content	309	111	75	416 t/	450
Concentrates:					
Gross weight	218	93	90 e/	1,163 r/	1,200
Sb content	131 e/	59	55 e/	291 t/	300
Cadmium	23	31	22	23 e/	33
Chromite:					
Gross weight (34% to 43% chromic oxide)	758,732	767,313	1,270,431	2,080,043 r/	1,668,285 3/
Salable product	531,112	642,376	501,851	1,460,000 r/ e/	1,171,000
Copper:					
Mine output (exclusive of pyrite):					
Gross weight	3,158,674	3,343,532	3,346,490	3,185,628	4,800,000
Cu content of ore	38,554	39,163	34,902	40,085 r/	58,000
Cu content of pyrite e/	620	350 r/	350 r/	2,100 t/	2,100
Concentrates (exclusive of pyrite):					
Gross weight	143,196	140,165	139,919	141,000 e/	240,000
Cu content	26,500 e/	23,879	28,891	24,000 e/	48,000
Metal:					
Smelter output (primary + secondary)	31,568	39,638	30,400	33,700 e/	38,600
Refined e/	104,000	92,400	82,700	98,500 e/	120,000
Gold, byproduct of base metals refining e/ 4/ kilograms	1,250	1,110	996	1,200	1,200
Iron and steel:					
Iron ore:					
Gross weight thousand metric tons	5,917	6,480	5,755	4,931 r/	6,404 3/
Fe content e/ do.	3,200	3,324	3,148	2,750 r/	3,500
Metal:					
Pig iron and ferroalloys:					
Ferchromium	85,755	90,030	97,585	94,251 r/	101,450 3/
Ferrosilicon	1,250	4,680	4,930	4,900	5,000
Pig iron and other ferroalloys thousand metric tons	4,508	4,353	4,604	4,363 r/	5,263 3/
Steel, crude including castings do.	10,343	11,838	12,074	12,744	13,382 3/
Lead:					
Mine output, Pb and Pb-Zn ores:					
Gross weight	233,944	179,731	232,140	253,100	289,072 3/
Pb content	10,800 e/	11,448	11,158	10,376 r/	10,000
Concentrates:					
Gross weight	28,000 e/	8,021	5,683	5,318 r/	5,300
Pb content	7,000 e/	2,571	1,279	1,196 r/	1,200
Metal, refined e/	9,000	5,000	5,100	4,000	4,000
Manganese ore, gross weight 5/	10,000 e/	37,491	34,500	49,700 r/	37,000
Mercury kilograms	5,000	--	--	--	--
Silver, mine output, Ag content e/ 6/ do.	103,000	103,000	65,000	70,000 r/	70,000
Zinc:					
Mine output, Zn and Pb-Zn ore:					
Gross weight	306,960	231,756	297,252	73,110 r/	90,000
Zn content	32,514	20,500 e/	26,300 e/	9,118 r/	12,000
Concentrates: e/					
Gross weight	37,000	23,000	30,000	9,760 r/	12,000
Zn content	13,000	8,000	10,000	5,774 r/	6,600
Metal, smelter, primary	18,770	18,500	18,567	17,050 r/	24,000
INDUSTRIAL MINERALS					
Abrasives, natural, emery	41,474	10,988	12,000	14,149 r/	14,000
Barite, run of mine	311,335	118,367	116,220	153,719	160,000

See footnotes at end of table.

TABLE 1--Continued
TURKEY: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity	1992	1993	1994	1995	1996 e/	
INDUSTRIAL MINERALS--Continued						
Boron minerals:						
Run of mine	1,796,100	1,892,356	2,092,032	1,768,919	2,379,160 3/	
Concentrates	1,058,885	1,079,135	1,139,980	1,143,994 r/	1,200,000	
Cement, hydraulic	thousand metric tons	28,607	31,241	29,493	33,153	35,214 3/
Clays:						
Bentonite	123,516	456,597	516,187	602,499 r/	600,000	
Kaolin	134,416	210,356	179,775	489,635 r/	490,000	
Other	500,000 e/	665,351	956,012	1,649,192 r/	1,600,000	
Feldspar, run of mine	464,736	366,166	502,608	760,250 r/	1,040,000	
Fluorspar	3,074	4,000 e/	6,671	8,873 r/	8,900	
Glass, crude e/	thousand metric tons	1,171 3/	1,300	1,400	1,400	1,500
Graphite, run of mine e/	20,978 3/	20,000	20,000	20,000	20,000	
Gypsum, other than that for cement	278,402	492,705	596,962 r/	596,967 r/	600,000	
Lime 7/	thousand metric tons	1,582	1,767	1,800 e/	897 r/	900
Magnesite, run of mine	1,224,900	525,640	1,279,614	1,928,064 r/	2,273,418 3/	
Meerschäum	kilograms	3,000	3,050	2,350	1,000 r/	500 3/
Nitrogen, N content of ammonia	344,275	325,800	350,000 e/	366,000 r/	518,800	
Perlite, run of mine	280,883	147,864	164,582	171,058 r/	175,000	
Phosphate rock (salable product)	64,803	77,671	--	--	--	
Pumice 8/	736,316	1,224,114	947,174	1,125,820 r/	1,125,000	
Pyrites, cupreous, gross weight	89,000	50,000 e/	50,000 e/	307,992 r/	300,000	
Salt, NaCl, all types	thousand metric tons	1,418	1,526	1,353	1,444 r/	1,400
Silica sand, washed product e/	do.	510	350	415	310	385
Sodium compounds, n.e.s.:						
Soda ash (trona) e/	do.	385	385	385	385	400
Sulfate, concentrates	75,058	170,680	307,049	314,192 r/	300,000	
Stone:						
Dolomite	255,310	376,518	378,004	425,877 r/	425,000	
Limestone, other than for cement	thousand metric tons	6,937	10,852	11,000 e/	20,496 r/	20,500
Marble e/	do.	550	730	750	272 r/	270
Quartzite	1,310,259	1,205,694	1,350,299	1,364,558 r/	1,350,000	
Strontium minerals, celestite: e/						
Run of mine	59,000	68,000	45,000	50,000	50,000	
Concentrates	37,940 3/	43,700	25,000	30,000	30,000	
Sulfates, n.e.s., aluminum sulfate (alunite)	9,278	13,500	12,165	9,763 r/	10,000	
Sulfur:						
Native, other than Frasch	22,700	17,400 e/	16,673	17,000 e/	--	
S content of pyrites e/	40,000	26,758 3/	27,000	130,000 r/	130,000	
Byproduct:						
Petroleum	16,861	21,000	25,000 e/	26,000 e/	25,000	
Other e/	5,000	5,000	5,000	5,000	5,000	
Total e/	84,561	70,158	73,673	178,000 r/	160,000	
Talc e/	3,918	4,000	4,000	4,000	4,000	
MINERAL FUELS AND RELATED MATERIALS						
Asphalt, natural	249,535	309,348	108,364	219,848	126,751 3/	
Carbon black e/	35,000	34,878 3/	35,000	39,975 r/	35,000	
Coal:						
Hard coal, run of mine	thousand metric tons	5,225	4,609	4,211	3,377 r/	3,606 3/
Lignite, run of mine	do.	50,439	51,359	55,038	56,031 r/	58,298 3/
Coke and semicoke	do.	3,257	2,899	2,799	3,021	3,217 3/
Gas:						
Natural, marketed	thousand cubic meters	197,796	199,739	198,630	181,515 r/	203,967 3/
Coal, manufactured e/	do.	38,789 3/	35,000	35,000	35,000	37,000
Petroleum:						
Crude	thousand 42-gallon barrels	30,656	27,871	26,399	24,124	25,000
Refinery products:						
Liquefied petroleum gas	do.	7,755	8,197	8,503	9,185	9,580 3/
Gasoline	do.	23,846	27,808	29,521	31,746	30,950 3/
Naphtha	do.	10,588	10,617	10,761	12,110	13,308 3/
Jet fuel	do.	5,495	9,015	10,380	12,119	11,324 3/
Kerosene	do.	1,125	1,282	819	605	726 3/

See footnotes at end of table.

TABLE 1--Continued
TURKEY: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity	1992	1993	1994	1995	1996 e/	
MINERAL FUELS AND RELATED MATERIALS--Continued						
Refinery products--Continued:						
Distillate fuel oil 9/	thousand 42-gallon barrels	49,570	54,103	55,197	59,556	55,838 3/
Lubricants e/	do.	1,985 3/	2,000	2,000	2,000	2,000
Residual fuel oil	do.	57,705	57,981	50,640	52,043	49,459 3/
Asphalt	do.	5,657	7,812	5,389	5,940	7,233 3/
Unspecified 10/ e/	do.	7,007 3/	6,700	6,700	6,700	4,000
Total	do.	170,733	185,515 e/	179,910 e/	192,004	184,418

e/ Estimated. r/ Revised.

1/ Table includes data available through Jan. 7, 1998. Large quantities of construction materials (clay, sand and gravel) are quarried. Also quarried are basalt, diabase, granite, onyx, sandstone, serpentine, slate, and travertine for building stone and limestone and gypsum for cement manufacture; however, information is inadequate to make estimates of output levels.

2/ Data are for public sector only. Data for private-sector production are not available, but production is believed to be about 30,000 metric tons per year.

3/ Reported figure.

4/ Data are estimated content of Turkish copper refinery tankhouse slimes.

5/ Does not include manganiferous iron ore from the Deveci Mine, production of which amounts to several hundred thousand tons per year and has a manganese content from 3% to 5%.

6/ Includes estimated content of base metals refinery tankhouse slimes.

7/ Data are lime produced for steel production and do not include the widespread artisanal production of lime for whitewash and sanitation purposes.

8/ Turkish pumice production is officially reported in cubic meters and has a density reported to range from 0.5 to 1.0 ton per cubic meter. Values in this table have been converted by using 1 cubic meter = 0.75 ton.

9/ Diesel fuel and special heating oil.

10/ Includes refinery fuel and losses.

TABLE 2
TURKEY: STRUCTURE OF THE MINERAL INDUSTRY FOR 1996

(Thousand metric tons unless otherwise specified)

Major commodities	Major operating companies and major equity owners ^{1 2}	Location of main facilities	Annual capacity
Aluminum and bauxite	Etibank Milas Boksit İşletmeleri Müdürlüğü (Etibank, 100%)	Open-pit mine at Milas, 127 kilometers southwest of Denizli	150 diaspore.
Do.	Etibank Seydişehir Alüminyum Tesisleri Müessesesi Müdürlüğü (Etibank, 100%)	Doğankuzu and Mortaş bauxite mines at Madenli, 25 kilometers south of Seydişehir	450 bauxite.
Do.	do.	Alumina refinery and aluminum smelter at Seydişehir	200 alumina, 60 aluminum.
Barite	Barit Maden Türk A.Ş.	Mines near Sivas and Adana	220 ground barite. ³
Do.	Baser Maden Sanayi ve Ticaret A.Ş.	Mines at Isparta and Konya	90 ground barite.
Do.	Emas Endüstri Mineralleri A.Ş.	Mine at Muş	100 ground barite.
Do.	Etibank Beyşehir Barit İşletmesi (Etibank, 100%)	Mine at Beyşehir, 72 kilometers southwest of Konya	70 barite ore.
Do.	Antalya Elektrometalurji Sanayi İşletmesi Müessesesi Müdürlüğü (Ado Mining, 100%)	Grinding plant at Antalya	100 ground barite.
Do.	Polbar Barit Endüstrisi A.Ş.	Mine near Antalya	120 ground barite.
Boron minerals	Etibank Bigadiç Madencilik İşletmeleri (Etibank, 100%)	Bigadiç, 38 kilometers southeast of Balıkesir	200 colemanite concentrate, 128 ulexite concentrate.
Do.	Etibank Emet Kolemanit İşletmeleri (Etibank, 100%)	Espey and Hisarcık Mines near Emet, 62 kilometers west-southwest of Kütahya	510 colemanite concentrate.
Do.	Etibank Kestelek Kolemanit İşletmeleri (Etibank, 100%)	Kestelek, 80 kilometers west-southwest of Bursa	100 colemanite concentrate.
Do.	Etibank Kırka Boraks İşletmeleri Müessesesi Müdürlüğü (Etibank, 100%)	Kırka, 61 kilometers north of Afyon	800 tincal concentrate.
Cement	Adana Çimento Sanayii T.A.Ş. (OYAK—Armed Forces Mutual Assistance Fund), 48.74%, other Government, ⁴ 47.28%)	12 kilometers east of Adana	2,185.
Do.	Akçansa. (Sabancı Group, 50%; S.A. Cimenteries CBR, 50%)	Büyükçekmece, 30 kilometers west of İstanbul and Mahmudiye, 40 kilometers south of Çanakkale	6,000.
Do.	Aslan Çimento A.Ş. (Lafarge Coppée, 86%)	Darıca, 40 kilometers southeast of İstanbul	1,600.
Do.	Baştaş Başkent Çimento Sanayii ve Tic. A.Ş.	Elmadağ, 35 kilometers east of Ankara	1,320.
Do.	Batı Anadolu Çimento Sanayii A.Ş.	Bornova, 10 kilometers northeast of İzmir	2,550.
Do.	Çimento Sanayi ve Ticaret A.Ş. (Sabancı Holdings A.S.)	Mersin	1,900.
Do.	Yibitaş Lafarge Group (Yibitaş Holdings A.S., 50%; Lafarge Coppée, 50%)	Çorum, Sivas and Yozgat plants	2,000.
Do.	Nuh Çimento Sanayi A.Ş.	Near Hereke 30 kilometers west of İzmit	2,000.
Do.	Rumeli Çimento Sanayi ve Tic. A.Ş.	Bartın, Gaziantep, Ladik, Trabzon, and Şanlıurfa plants	4,000.
Do.	OYAK Group	4 plants	2,280.
Do.	Set Group Holding (Soc. des Ciments Français, France, 100%)	5 plants in Marmara and Aegean coast regions	3,300.
Do.	Türkiye Çimento ve Toprak Sanayii T.A.Ş. (ÇİTOSAN) (Government, 100%)	7 plants	4,000. ⁵

See footnotes at end of table.

TABLE 2—Continued
TURKEY: STRUCTURE OF THE MINERAL INDUSTRY FOR 1996

(Thousand metric tons unless otherwise specified)

Major commodities	Major operating companies and major equity owners ^{1 2}	Location of main facilities	Annual capacity
Chromium:			
Chromite ores and concentrates	Etibank Şark Kromları İşletmesi Müessesesi Müdürlüğü (Etibank, 100%)	Mines at Güleman, 40 kilometers southeast of Elazığ	150 lump ore, 70 concentrate.
Do.	Etibank Uçköprü Maden İşletmesi Müessesesi Müdürlüğü (Etibank, 100%)	8 mines in Göcek District, west of Fethiye	15 lump ore, 30 concentrate.
Do.	Birlik Madencilik Ticaret ve Sanayi A.Ş.	Mines in Kayseri, Erzurum, and Erzincan Provinces	240 lump ore.
Do.	Akpaş Madencilik ve Paz. ve Ticaret A.Ş.	Mines in Erzurum, Erzincan, and Kayseri Provinces	200 lump ore, 70 concentrate.
Do.	Bilfer Madencilik A.Ş.	Mines in Kayseri and Sivas Provinces	350 lump ore,
Do.	Türk Maadin Şirketi (AŞ)	Mines at Köyceğiz, 56 kilometers northwest of Fethiye, and at Eskişehir	24 lump ore, 88 concentrate.
Do.	Dedeman Madencilik Turizm Sanayi ve Ticaret A.Ş.	Kayseri Province	56 lump ore.
Do.	Egemetal Madencilik A.Ş.	Mines in Bursa, Mersin, Eskişehir, and Erzurum Provinces	250 lump ore, 40 concentrate.
Do.	Pinar Madencilik ve Turizm A.Ş.	Mines in Kayseri and Adana Provinces	25 lump ore, 14 concentrate.
Do.	Akdeniz Madencilik Ticaret ve Sanayi A.Ş.	Adana	25 lump ore. ^e
Do.	Other (9) private producers	Mines in Köyceğiz, Bursa, Adana, İskenderun, and Eskişehir Provinces	114 lump ore, 12 concentrate.
Ferrochrome	Etibank Elazığ Ferrochrom İşletmesi (Etibank, 100%)	Ferrochrome plant, 50 kilometers east of Elazığ	150 high-carbon ferrochrome.
Do.	Etibank Antalya Elektrometalurji Sanayi İşletmesi Müessesesi Müdürlüğü (Etibank, 100%)	Ferrochrome plant at Antalya	11 low-carbon ferrochrome.
Coal:			
Hard coal	Türkiye Taşkömürü Kurumu Genel Müdürlüğü (TTK) (Government, 100%)	Mines in 5 coalfields near Zonguldak	7,000. ^e
Lignite	Türkiye Kömür İşletmeleri Kurumu (TKİ) (Government, 100%)	38 mines throughout Turkey	49,000. ^e
Do.	Private-sector producers	About 200 small mines throughout Turkey	8,000. ^e
Copper	Etibank Küre Bakırlı Pirit İşletmesi Müessesesi Müdürlüğü (Etibank, 100%)	Open-pit copper and pyrite mine at Küre, 14 kilometers south of İnebolu	90 copper concentrate, 460 pyrite concentrate.
Do.	Çayeli Bakır İşletmeleri A.Ş. (Inmet Mining Corp., 49%, Etibank, 45%, Gama Endüstri, 5%, and Gama Holding, 1%)	Çayeli Mine, 85 kilometers east of Trabzon	24 copper concentrate.
Do.	Etibank Ergani Bakır İşletmesi Müessesesi Müdürlüğü (Etibank, 100%)	Open-pit mine and smelter at Ergani, 59 kilometers southeast of Elazığ	16 blister copper. ³
Do.	Karadeniz Bakır İşletmeleri A.Ş. (Etibank, 99.91%)	Mine and concentrator at Murgul near Artvin; mines at Sürmene and Espiye near Trabzon	175 copper concentrate, ^e 20 blister copper. ^{e 3}
Do.	do.	Open-pit Kutlular Mine near Trabzon	15 copper concentrate. ^e
Do.	do.	Underground mine near Küre	95 ore. ^e
Do.	Karadeniz Bakır İşletmeleri A.Ş. (Etibank, 99.91%)	Smelter and acid plant at Samsun	38 blister copper.
Do.	Rabak Elektrolitik Bakır ve Mam. A.Ş.	İstanbul	35 refined copper.
Do.	Sarkuysan Elektrolitik Bakır Sanayii ve Ticaret A.Ş.	Gebze, 40 kilometers west of İzmit	70 refined copper.

See footnotes at end of table.

TABLE 2—Continued
TURKEY: STRUCTURE OF THE MINERAL INDUSTRY FOR 1996

(Thousand metric tons unless otherwise specified)

Major commodities	Major operating companies and major equity owners ^{1 2}	Location of main facilities	Annual capacity
Copper—Continued:	Er-Bakır Elektrolitik Bakır Mam. A.Ş.	Denizli	18 refined copper.
Iron and steel:			
Iron ore	Türkiye Demir ve Çelik İşletmeleri Genel Müdürlüğü (TDÇİ) (Government, 100%)	Divriği Mine, 115 kilometers northwest of Elazığ	3,000 ore; ^e 1,100 pellets; 600 concentrate; 500 lump ore.
Do.	do.	Deveci Mine at Hekimhan, 112 kilometers west of Elazığ	750 ore. ^e
Do.	Bilfer Madencilik A.Ş.	Mines near Divriği	1,500 ore.
Steel	Türkiye Demir ve Çelik İşletmeleri Genel Müdürlüğü (TDÇİ) (Government, 100%)	İskenderun	2,200 crude steel.
Do.	Ereğli Demir ve Çelik Fabrikaları T.A.Ş. (Erdemir) (Government, ⁴ 51.66%, others, 48.34%)	Ereğli	3,000 crude steel.
Do.	Karabük Demir ve Çelik A.S.	Karabük	680 crude steel.
Do.	Makina ve Kimya Endüstrisi Kurumu (MKEK) (Government, 100%)	Kırıkkale, 62 kilometers east of Ankara	60 crude steel.
Do.	Çolakoğlu Metalurji A.Ş.	Gebze, 40 kilometers west of İzmit	650 crude steel, 1,050 semifinished steel.
Do.	Çukurova Çelik Endüstrisi A.Ş.	Aliağa, 40 kilometers north-northeast of İzmir	2,000 semifinished steel.
Do.	Diler Demir Çelik Endüstri ve Ticaret A.Ş.	Izmit	310 semifinished steel.
Do.	Ekinciler Demir ve Çelik Sanayi A.Ş.	Arc furnace and 1 rolling mill at İskenderun. Rolling mills at Adana, Karabük, and near İskenderun (Payas)	600 semifinished steel.
Do.	Habaş Sınai ve Tibbi Gazlar İstihsal Endüstrisi A.Ş.	Aliağa	600 semifinished steel.
Do.	İzmir Demir Çelik Sanayi A.Ş. (İDÇ) (İş-Bakansi, 60%, others, 30%)	do.	550 semifinished steel.
Do.	Kroman Çelik Sanayi A.Ş.	Gebze, 40 kilometers west of İzmit	420 semifinished steel.
Do.	Metaş İzmir Metalurji Fabrikası T.A.Ş.	Izmir	450 special and semifinished steel.
Do.	Sivas Demir-Çelik İşletmeleri A.Ş.	Sivas	450 semifinished steel.
Do.	Other private-sector companies.	Plants near Bursa, Izmir, and İstanbul	1,448 semifinished steel.
Magnesite	ÇİTOSAN Konya Krom Magnezit Tuğla Sanayii A.Ş. (Government, 100%)	Konya	40 dead-burned magnesite, 38 bricks, 12 mortar.
Do.	Kümaş Kütahya Manyezit İşletmeleri A.Ş. (Zeytinoğlu Holding A.S., 97.44%)	Kütahya	144 dead-burned magnesite, 46 bricks.
Do.	Comag Continental Madencilik Sanayii Tic. A.Ş.	Mines at Tavşanlı, 40 kilometers northwest of Kütahya, and near Bursa	40 dead-burned magnesite.
Do.	Magnesit A.Ş. (Veitscher Magnesitwerke AG, Austria)	Mine at Margı, 50 kilometers northeast of Eskişehir	80 dead-burned magnesite.
Mercury	metric tons	Etibank Haliköy Maden İşletmesi (Etibank, 100%)	Mine near Odemiş, about 70 kilometers southeast of İzmir
Do.	Etibank Konya Çıva İşletmesi (Etibank, 100%)	Mine at Sarayönü, 47 kilometers north of Konya	100 mercury. ³

See footnotes at end of table.

TABLE 2—Continued
TURKEY: STRUCTURE OF THE MINERAL INDUSTRY FOR 1996

(Thousand metric tons unless otherwise specified)

Major commodities		Major operating companies and major equity owners ^{1 2}	Location of main facilities	Annual capacity
Petroleum and natural gas:				
Crude petroleum thousand 42-gallon barrels		Türkiye Petrolleri Anonim Ortaklığı (TPAO) (Government, 100%)	Production from 34 fields, mostly in Diyarbakır, Gaziantep, and Siirt Provinces	19,500. ^e
Do.	do.	Perenco Plc.	Production from 27 fields in Diyarbakır and Siirt Provinces	5,000. ^e
Do.	do.	Other producers (private sector and in joint venture with TPAO)	Production from 27 fields, mostly in Diyarbakır, Gaziantep and Siirt Provinces	9,000. ^e
Refined petroleum	do.	Türkiye Petrol Rafinerileri A.Ş. (TÜPRAŞ) (Government, ⁴ 100%)	Refinery at Batman	7,700 crude input.
Do.	do.	do.	Refinery at Aliğa	70,000 crude input.
Do.	do.	do.	Refinery at İzmit	91,000 crude input.
Do.	do.	do.	OAR refinery at Kırıkkale	35,000 crude input.
Do.	do.	Anadolu Tasfiyehanesi A.Ş. (ATAŞ)	Refinery at Mersin	30,800 crude input.
Natural gas thousand cubic meters		Türkiye Petrolleri Anonim Ortaklığı (TPAO) (Government, 100%)	Çamurlu Field, Siirt Province	800. ^e
Do.	do.	do.	Hamitabat Field, in Thrace	205,000. ^e
Do.	do.	do.	Umurca Field, in Thrace	10. ^e
Silver kilograms		Etibank 100. Yıl Gümüş Madeni İşletmeleri Müessesesi Müdürlüğü (Etibank, 100%)	Aktepe Mine near Gümüşköy, 20 kilometers west-northwest of Kütahya	75,000. ^e
Strontium		Barit Maden Türk A.Ş.	Mine at Akkaya, 25 kilometers south of Sivas	100 celestite concentrate. ^e
Sulfur		Keçiborlu Kükürt İşletmesi Müessesesi Müdürlüğü (Etibank, 100%)	Mine at Keçiborlu, 30 kilometers northwest of Isparta	55.
Do.		Türkiye Petrol Rafinerileri A.Ş. (TÜPRAŞ) (Government, ⁴ 100%)	Recovery plants at company oil refineries	23.
Zinc		Çayeli Bakır İşletmeleri A.Ş. (Inmet Mining Corp., 49%, Etibank, 45%, Gama Endüstri, 5%, and Gama Holding, 1%)	Çayeli Mine, 85 kilometers east of Trabzon	36 zinc concentrate.
Do.		Çinko Kurşun Metal Sanayii A.Ş. (ÇİNKUR) (Kayseri Maden Metal ve Ticaret A.Ş., 85%)	Zinc-lead smelter at Kayseri	34 zinc, 125 tons cadmium.

^eEstimated.

¹Turkish private-sector ownership unless otherwise noted.

²Etibank refers to the 100% Government-owned group administered by Etibank Genel Müdürlüğü.

³Facility was idle in 1996.

⁴Shares are held by the Public Participation Fund Administration (PPFA) for eventual privatization.